SCALLOP FISHERY AREA/TIME CLOSURE TO PROTECT COD SPAWNING AGGREGATIONS IN 5Z (GEORGES BANK)

Context

Canada is required to account for all fishing mortality of Georges Bank cod (*Gadus morhua*) and one aim is to reduce the bycatch in the offshore scallop fishery. In order to reduce bycatch and to minimize disturbance to spawning aggregations of cod by the offshore scallop fishery on Georges Bank, DFO has implemented time-area closures since 2005. To inform resource managers in determining appropriate area closures for the offshore scallop fishery on Georges Bank during the cod spawning seasons, Fisheries and Aquaculture Management (FAM) asked the following question. "What does a review of 5Z cod distribution, particularly at spawning time, reveal about the spatial and temporal trends of the species and its overlap with the offshore scallop fishery? Highlight areas of high 5Z cod distribution using the cells which have already been defined and used in previous years." This document provides the requested information on the spatial distribution of cod abundance and its overlap with scallop catches on Georges Bank. The information provided in this document is an update of information provided annually since 2006.

Analysis and Response

The analysis used for this information has been updated with the 2009 cod abundance data (obtained from the annual DFO RV survey) and scallop catches. The protocol to handle both the cod abundance data and the offshore scallop catch data is the same as in the Science Expert Opinion 2006 (DFO, 2006). Information from the DFO bottom trawl survey conducted during late February/early March was used to identify areas of high aggregations of adult (ages 3+) cod. From these data, two scenarios were examined: 1) using data from the last 10-year period (2000-2009) and 2) using all available data (1996-2009).

Under Scenario 1, the high cod aggregation areas for the last decade (Figure 1. Cells numbered 1 to 16 in order of decreasing abundance) were compared to first quarter scallop catches in those areas (Table 1). Under Scenario 2, the high cod aggregation areas for the last fourteen years (Figure 2. Cells numbered 1 to 16 in order of decreasing abundance) were compared to first quarter scallop catches in those areas (Table 2).

The 2009 first quarter offshore scallop catches correspond to 17% (988 tonnes of meats) of the total landings for the year, which is similar to the long term average landings for the first quarter. There were two voluntary scallop seed closures in place when the fishery opened in January 2009. In February, those two closure areas were modified and two additional voluntary scallop seed closures were implemented in the Northwest area of Georges Bank. At the start of the 2010 fishery, there were two scallop seed closure areas in place, outlined in red in Figures 1 and 2.

Scenario 1 (Figure 1) shows some continuity in the location of high ranking cells with the 10 year scenario from last year, and is becoming more similar to the longer range scenario (Scenario 2). The highest ranked cells for 3+ cod abundance are dispersed throughout the fishing bank with an aggregation of approximately 10 cells located toward the center of the bank. However, there are some differences from a similar analysis provided in 2009. One cell was dropped from the ranking and four new cell locations (cells 2, 3, 15 and 16 in 2010) were added.

In Scenario 2 (Figure 2), cell locations included in the highest ranking for age 3+ cod abundance are the same as those observed in the analysis conducted in 2009; however the ranking order varies from last year. This scenario has shown stability from year to year as current data is added. Scenario 2 continues to show an aggregation of age 3+ cod in the center of the bank with 11 high ranking cells grouped together. Both Scenario 1 and 2 have the same four cells ranked the highest for 2010.

The closure area for the past four years has consistently covered the same geographical area (cells labeled as numbers 1, 4, 5, 6, 7, 9 and 14 in 2010, Scenario 2) and provided a closure that encompassed a cluster of cells. When comparing the 2010 scenarios (Figures 1 and 2) the strongest aggregation of cod occurs in an area near the center of the bank. Although there are variations in annual distribution of the 3+ cod abundance, aggregations have been consistently observed in this area, near the center of the bank in all scenarios presented in this document.

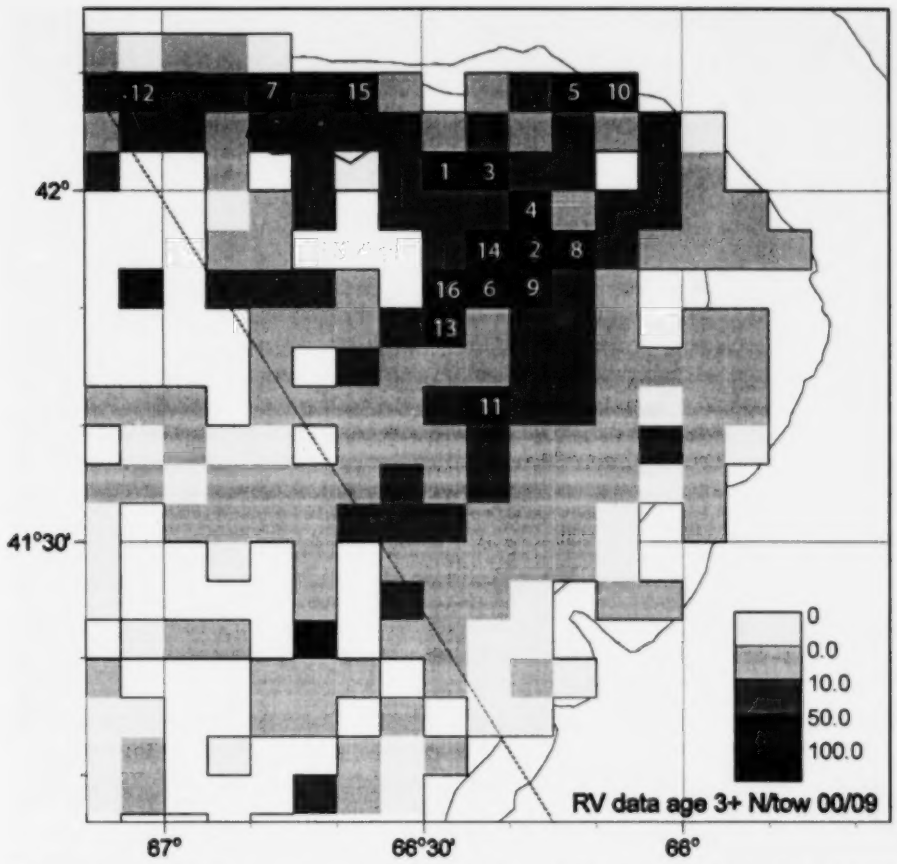

Figure 1. Scenario 1 - Distribution of aggregated age 3+ cod RV data for the period of 2000 to 2009. Cells on the Canadian side with 50+ cod per call have been ranked in descending order. The current scallop seed closures are outlined in red.

Table 1. Scenario 1 - association between first quarter scallop catch (tonnes of meats) by the offshore scallop fleet and cells of high cod density (cells with 50 or more age 3+ cod on average in Feb.-Mar. survey data). The cod cells, numbered 1 to 16, are in descending order of abundance. Grey scale rankings indicate the abundance of scallop catch that corresponds to each cell of high cod density.

Year / cod cell no.	1*	2	3	4*	5*	6*	7*	8	9*	10	11	12	13	14*	15	16
2000																
2001																
2002																
2003																
2004																
2005																
2006																
2007																
2008																
2009																

* *indicates cells that were part of the 2009 closure (plus one cell west of 14)*

Legend: Scallop Catch

Color	Scallop Catch (t of meats)
	catch ≥ 50
	25 ≤ catch < 50
	10 ≤ catch < 25
	0 < catch < 10
	catch = 0

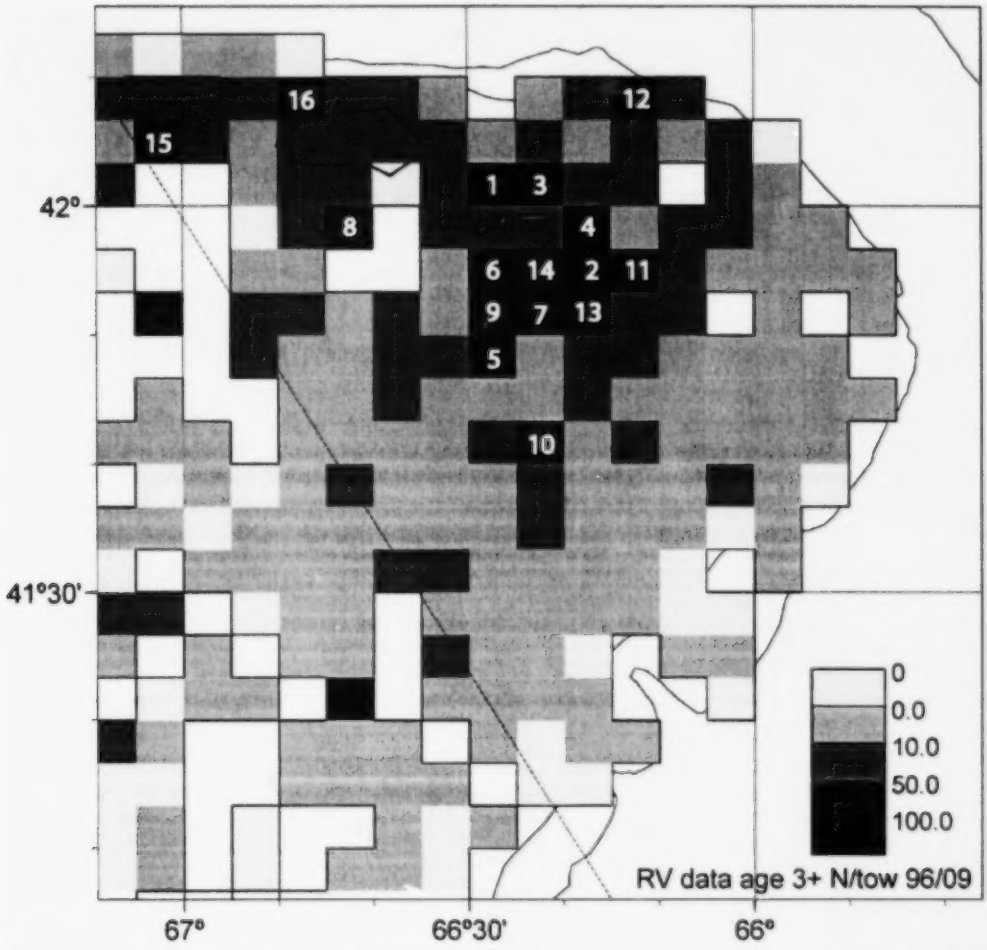

Figure 2. Scenario 2 - Distribution of aggregated age 3+ cod RV data for the period of 1996 to 2009. Cells on the Canadian side with 50+ cod per cell have been ranked in descending order. The current scallop seed closures are outlined in red. The 2009 scallop time/area closure for cod spawning corresponds to cells 1,4,5,6,7,9,14 in the map above.

Table 2. Scenario 2 - association between first quarter scallop catch (tonnes of meats) by the offshore scallop fleet and cells of high cod density (cells with 50 or more age 3+ cod on average in Feb.-Mar. survey data). The cod cells, numbered 1 to 16, are in descending order of abundance. Grey scale rankings indicate the abundance of scallop catch that corresponds to each cell of high cod density.

Year/Cod cell no.	1*	2	3	4*	5*	6*	7*	8	9*	10	11	12	13	14*	15	16
1996																
1997																
1998																
1999																
2000																
2001																
2002																
2003																
2004																
2005																
2006																
2007																
2008																
2009																

** indicates cells that were part of the 2009 closure*

Legend: Scallop Catch

Color	Scallop Catch (t of meats)
	catch ≥ 50
	25 ≤ catch < 50
	10 ≤ catch < 25
	0 < catch < 10
	catch = 0

Conclusions

Considering a cod area/time closure for 2010 with a similar location as the cod area/time closure of 2009 should achieve the aims of reducing cod bycatch and disturbance of spawning aggregations while also having a relatively low impact on the offshore scallop fishery. Due to cod area/time closures in the past few years during the first quarter, the scallop catch on Georges Bank for the first quarter has been dispersed to other locations.

With the addition of the 2009 cod data to the existing dataset, the cell rankings changed with the exception of the highest ranked cell in both scenarios. In addition, cell positions changed in Scenario 1, with four new cells added. These changes in cell rankings and, in Scenario 1 some of their locations, may warrant a slight change in the location of the closure area to encompass the highest ranked cells within the cluster located in the center of the bank.

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Sources of Information

DFO. 2006. Science Expert Opinion on Scallop Fishery Area/Time Close - 2006. Mar. Reg. Expert Opin. 2006/05.

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